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BTEC

Mark Scheme (Results)

June 2022

Pearson BTEC Nationals
In Applied Science (31617H)
Unit 1: Principles and Applications of Science I - Biology

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Unit 1: Principles and Applications of Science I

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

BTEC Next Generation Mark Scheme

Question Number	Answer	Additional Guidance	Mark
1 (a)(i)	A – capsule		1
1 (a)(ii)	One from: nucleic acid DNA chromosome	 accept genetic material	1
1 (a)(iii)	any one from: • separate the cell from its surroundings • regulate the movement of substances into and out of the cell • involved in cell signaling any other valid responses	 Allow named substance	1
1 (b)	any one from: (nucleus) is membrane-bound has an envelope has a (double) membrane has nucleoplasm has a nucleolus has (linear) chromosomes accept any other valid response	ORA reject chromosome singular	1
		Total	4 marks

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2 (a)</td><td>A – aerobic respiration</td><td></td><td>1</td></tr>
<tr><td>2 (b)</td><td>
<table>
<tr><th>organelle</th><th>found in animal cells</th><th>found in plant cells</th></tr>
<tr><td>cell wall</td><td>No</td><td>Yes</td></tr>
<tr><td>ribosomes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>cytoplasm</td><td>Yes</td><td>Yes</td></tr>
<tr><td>amyloplasts</td><td>No</td><td>Yes</td></tr>
</table>
</td><td>accept tick for yes and cross for no

any 2 correct= 1 mark

3 or 4 correct= 2 marks

5 or 6 correct= 3 marks</td><td>3</td></tr>
</table>

2 (c)	Award **one** mark for identification points and **one** marks for expansion points up to a maximum of **two** marks. Any of the following could be an identification point or an expansion point depending on how the learner shapes their response. can absorb/trap light (energy) (1) chloroplasts/chlorophyll (1) large surface area (1) large surface area (1) to absorb/trap light (energy) (1) (large) vacuole (1) pushes chloroplasts to edge of cell (1) thin cell wall (1) short diffusion distance for carbon dioxide (1) {clear/transparent} <u>cell wall</u> (1) allows light through (1) cylindrical shape (1) allows many cells packed into (top layer) of leaf (1) gives spaces between cells allow gas exchange/light (1) cytoskeleton (1) can move chloroplasts around (1) {to trap more light/ move to bottom to avoid damage by bright light} (1) allow any other valid response		2
		Total	6 marks

Question Number	Answer	Additional Guidance	Mark
3 (a)	movement/propulsion/swim/locomotion/ to reach the egg		1
3 (b)	R corona (radiata) S zona pellucida T {enzymes/acrosin/protease}	accept phonetic spelling ignore acrosome	3
3 (c)	any one from: (sperm nucleus has) half the number of chromosomes is haploid has only one set of chromosomes has 23 chromosomes	ORA accept n for haploid	1
		Total	5 marks

Question Number	Answer	Additional Guidance	Mark
4 (a)	any one from: • smoking • genetics / hereditary • air pollution • (long-term) exposure to dust / particles • asthma accept any other valid response	 ignore age ignore reference to diet/ obesity	1

4 (b)	reading off the graph (1) 3000 and 3750 difference between figures on the graph (1) 3750 – 3000 divide by original (1) $\frac{750}{3000}$ X 100 for percentage (1) 25 (%) **Alternative method** reading off the graph (1) 3750 and 3000 final / original (1) $\frac{3750}{3000}$ X 100 for percentage (1) 125 –100 (1) 25(%)	accept any number that rounds up to 25(%) correct answer with no working gets full marks ecf	4

4 (c)	Award **two** marks for identification points and **two** marks for expansion points up to a maximum of **four** marks. Any of the following could be an identification point or an expansion point depending on how the learner shapes their response. macrophages (1) break down alveoli (walls/membrane/squamous epithelial) (1) less surface area (for diffusion) (1) (macrophages) release {elastase / protease / enzymes / chemicals} (1) reduces elasticity (1) alveoli can't recoil (1) person cannot exhale / cannot bring in fresh oxygen (1) cannot maintain concentration gradients (1) mucus build-up (1) scarring (1) increases the diffusion pathway (1) allow any other valid response	ORA throughout allow fewer alveoli accept damage allow shortness of breath allow walls thicken	4
		Total	9 marks

Question number	Indicative content
5	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content, but learners should be rewarded for other relevant answers. **myelinated neurones** conduction faster axons have fatty / myelin sheath (which is) made from Schwann cells wrapped around the axon flattened Schwann cells are mainly (lipid) membrane protects / insulates the axon prevents loss of ions gaps between Schwann cells are nodes of Ranvier exposed axon membrane where action potentials can occur because ions can enter and leave the axon (nodes) contains ion channels so impulse jumps from node to node / saltatory (so) faster transmission than when action potentials occur along whole length of (unmyelinated) axons **non-myelinated neurones** conduction slower axons don't have a fatty / myelin sheath increased axon diameter gives increased speed of conduction (so) in animals with large unmyelinated axons (e.g. octopus), speed of conduction is fast no protection / insulation of axon ions can be lost impulse cannot jump /not saltatory/ is continuous action potentials occur along whole length

Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–2	• Demonstrates adequate knowledge of scientific facts / concepts with generalised comments made. • Generic statements may be presented rather than linkages being made so that lines of reasoning are unsupported or partially supported. • The discussion shows some structure and coherence.
Level 2	3–4	• Demonstrates good knowledge and understanding by selecting and applying some relevant scientific knowledge facts/concepts to provide the discussion being presented. • Lines of argument mostly supported through the application of relevant evidence. • The discussion shows a structure which is mostly clear, coherent and logical.
Level 3	5–6	• Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of scientific facts/concepts to provide the discussion being presented. • Line(s) of argument consistently supported throughout by sustained application of relevant evidence. • The discussion shows a well-developed structure which is clear, coherent and logical.

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